I claim:

1. A method of conferring disease resistance to a transgenic plant, the method comprising

a) providing a transgenic plant comprising a recombinant DNA molecule comprising a promoter operably linked to a DNA sequence comprising, in the 5' to 3' direction,

i) a sequence complementary to a coding sequence for a heterologous polypeptide capable of conferring disease resistance;

ii) a sequence complementary to an internal ribosome entry site;

iii) a 3' UTR of a first positive strand single-stranded RNA virus; and

b) growing the transgenic plant,

whereby resistance is conferred to infection from a second positive strand single-stranded RNA virus.

2. The method of conferring disease resistance to a transgenic plant of claim 1, wherein the promoter is selected from the group consisting of a constitutive promoter and an inducible promoter.

3. The method of conferring disease resistance to a transgenic plant of claim 2, wherein the promoter is a constitutive promoter.

4. The method of conferring disease resistance to a transgenic plant of claim 3, wherein the constitutive promoter is a eukaryotic constitutive promoter selected from the group consisting of a cauliflower mosaic virus 35S promoter, a blueberry red ringspot virus promoter, a ubiquitin gene promoter, an actin gene promoter, an NeIF-4A10 promoter, a maize Adh1-based pEmu promoter, a barley leaf thionin BTH6 promoter, a cassava vein mosaic virus promoter, a sugarcane bacilliform badnavirus promoter and a histone gene promoter.

5. The method of conferring disease resistance to a transgenic plant of claim 4, wherein the eukaryotic constitutive promoter is a cauliflower mosaic virus 35S promoter.

6. The method of conferring disease resistance to a transgenic plant of claim 5, wherein the cauliflower mosaic virus 35S promoter comprises the sequence:
AGATTAGCCTTTTCAATTTCAGAAAGAATGCTAACCCACAGATGGTTAGA
GAGGCTTACGCAGCAGGTCTCATCAAGACGATCTACCCGAGCAATAATCT

CCAGGAAATCAAATACCTTCCCAAGAAGGTTAAAGATGCAGTCAAAAGAT
TCAGGACTAACTGCATCAAGAACACAGAGAAAGATATATTTCTCAAGATC
AGAAGTACTATTCCAGTATGGACGATTCAAGGCTTGCTTCACAAACCAAG
GCAAGTAATAGAGATTGGAGTCTCTAAAAAGGTAGTTCCCACTGAATCAA
AGGCCATGGAGTCAAAGATTCAAATAGAGGACCTAACAGAACTCGCCGTA
AAGACTGGCGAACAGTTCATACAGAGTCTCTTACGACTCAATGACAAGAA
GAAAATCTTCGTCAACATGGTGGAGCACGACACACTTGTCTACTCCAAAA
ATATCAAAGATACAGTCTCAGAAGACCAAAGGGCAATTGAGACTTTTCAA
CAAAGGGTAATATCCGGAAACCTCCTCGGATTCCATTGCCCAGCTATCTGT
CACTTTATTGTGAAGATAGTGGAAAAGGAAGGTGGCTCCTACAAATGCCA
TCATTGCGATAAAGGAAAGGCCATCGTTGAAGATGCCTCTGCCGACAGTG
GTCCCAAAGATGGACCCCCACCCACGAGGAGCATCGTGGAAAAAGAAGA
CGTTCCAACCACGTCTTCAAAGCAAGTGGATTGATGTGATATCTCCACTGA
CGTAAGGGATGACGCACAATCCCACTATCCTTCGCAAGACCCTTCCTCTAT
ATAAGGAAGTTCATTTCATTTGGAGAGAACACG (SEQ ID NO: 3).

7. The method of conferring disease resistance in a transgenic cell of claim 1, wherein the coding sequence for a heterologous polypeptide encodes a polypeptide selected from the group consisting of a cell toxin and a viral polypeptide.

8. The method of conferring disease resistance in a transgenic cell of claim 7, wherein the viral polypeptide is a viral coat protein polypeptide.

9. The method of conferring disease resistance to a transgenic plant of claim 1, wherein the sequence complementary to an IRES is a sequence complementary to an IRES selected from the group consisting of a picornavirus IRES, a foot-and-mouth disease virus IRES, an encephalomyocarditis virus IRES, a hepatitis A virus IRES, a hepatitis C virus IRES, a human rhinovirus IRES, a poliovirus IRES, a swine vesicular disease virus IRES, a turnip mosaic potyvirus IRES, a human fibroblast growth factor 2 mRNA IRES, a pestivirus IRES, a Leishmania RNA virus IRES, a Moloney murine leukemia virus IRES a human rhinovirus 14 IRES, an aphthovirus IRES, a human immunoglobulin heavy chain binding protein mRNA IRES, a *Drosophila* Antennapedia mRNA IRES, a human fibroblast growth factor 2 mRNA IRES, a hepatitis G virus IRES, a tobamovirus IRES, a vascular endothelial growth factor mRNA IRES, a Coxsackie B group virus IRES, a c-myc protooncogene mRNA IRES, a human MYT2 mRNA IRES, a human parechovirus type 1 virus IRES, a human parechovirus type 2 virus IRES, a eukaryotic initiation factor 4GI

mRNA IRES, a Plautia stali intestine virus IRES, a Theiler's murine encephalomyelitis virus IRES, a bovine enterovirus IRES, a connexin 43 mRNA IRES, a homeodomain protein Gtx mRNA IRES, an AML1 transcription factor mRNA IRES, an NF-kappa B repressing factor mRNA IRES, an X-linked inhibitor of apoptosis mRNA IRES, a cricket paralysis virus RNA IRES, a p58(PITSLRE) protein kinase mRNA IRES, an ornithine decarboxylase mRNA IRES, a connexin-32 mRNA IRES, a bovine viral diarrhea virus IRES, an insulin-like growth factor I receptor mRNA IRES, a human immunodeficiency virus type 1 gag gene IRES, a classical swine fever virus IRES, a Kaposi's sarcoma-associated herpes virus IRES, a short IRES selected from a library of random oligonucleotides, a Jembrana disease virus IRES, an apoptotic protease-activating factor 1 mRNA IRES, a Rhopalosiphum padi virus IRES, a cationic amino acid transporter mRNA IRES, a human insulin-like growth factor II leader 2 mRNA IRES, a giardiavirus IRES, a Smad5 mRNA IRES, a porcine teschovirus-1 talfan IRES, a *Drosophila* Hairless mRNA IRES, an hSNM1 mRNA IRES, a Cbfa1/Runx2 mRNA IRES, an Epstein-Barr virus IRES, a hibiscus chlorotic ringspot virus IRES, a rat pituitary vasopressin V1b receptor mRNA IRES, and a human hsp70 mRNA IRES.

10. The method of conferring disease resistance to a transgenic plant of claim 9, wherein the sequence complementary to an internal ribosome entry site is a sequence complementary to a picornavirus internal ribosome entry site.

11. The method of conferring disease resistance to a transgenic plant of claim 10, wherein the sequence complementary to a picornavirus internal ribosome entry site comprises the sequence:

TTATCATCGTGTTTTTCAAAGGAAAACCACGTCCCCGTGGTTCGGGGGGCC
TAGACGTTTTTTTAACCTCGACTAAACACATGTAAAGCATGTGCACCGAG
GCCCCAGATCAGATCCCATACAATGGGGTACCTTCTGGGCATCCTTCAGCC
CCTTGTTGAATACGCTTGAGGAGAGCCATTTGACTCTTTCCACAACTATCC
AACTCACAACGTGGCACTGGGGTTGTGCCGCCTTTGCAGGTGTATCTTATA
CACGTGGCTTTTGGCCGCAGAGGCACCTGTCGCCAGGTGGGGGGTTCCGC
TGCCTGCAAAGGGTCGCTACAGACGTTGTTTGTCTTCAAGAAGCTTCCAGA
GGAACTGCTTCCTTCACGACATTCAACAGACCTTGCATTCCTTTGGCGAGA
GGGGAAAGACCCCTAGGAATGCTCGTCAAGAAGACAGGGCCAGGTTTCC
GGGCCCTCACATTGCCAAAAGACGGCAATATGGTGGAAAATCACATATAG

ACAAACGCACACCGGCCTTATTCCAAGCGGCTTCGGCCAGTAACGTTAGG GGGGGGGGAGGGAGAGGGGCGGAATT (SEQ ID NO: 6).

12. The method of conferring disease resistance to a transgenic plant of claim 1, wherein the 3' UTR of a first positive strand single-stranded RNA virus is a 3' UTR of a first positive strand single-stranded RNA virus having no DNA stage.

13. The method of conferring disease resistance to a transgenic plant of claim 12, wherein the 3' UTR of a first positive strand single-stranded RNA virus having no DNA stage is a 3' UTR of a first bromovirus.

14. The method of conferring disease resistance to a transgenic plant of claim 13, wherein the 3' UTR of a first bromovirus is a 3' UTR of a first Cowpea chlorotic mottle virus.

15. The method of conferring disease resistance to a transgenic plant of claim 14, wherein a DNA copy of the 3' UTR of a first Cowpea chlorotic mottle virus comprises the sequence:

AGTGCCCGCTGAAGAGCGTTACACTAGTGTGGCCTACTTGAAGGCTAGTT ATAACCGTTTCTTTAAACGGTAATCGTTGTTGAAACGTCTTCCTTTTACAA GAGGATTGAGCTGCCCTTGGGTTTTACTCCTTGAACCCTTCGGAAGAACTC TTTGGAGTTCGTACCAGTACCTCACATAGTGAGGTAATAAGACTGGTGGG CAGCGCCTAGTCGAAAGACTAGGTGATCTCTAAGGAGACC (SEQ ID NO: 8).

16. The method of conferring disease resistance to a transgenic plant of claim 1, further comprising a sequence complementary to an intron.

17. The method of conferring disease resistance to a transgenic plant of claim 1, further comprising a transcription termination signal.

18. The method of conferring disease resistance to a transgenic plant of claim 1, wherein the plant is a dicotyledonous plant.

19. The method of conferring disease resistance to a transgenic plant of claim 19, wherein the dicotyledonous plant is a *Nicotiana* plant.

20. The method of conferring disease resistance to a transgenic plant of claim 20, wherein the *Nicotiana* plant is a *Nicotiana benthamiana* plant.

21. The method of conferring disease resistance to a transgenic plant of claim 1, wherein the second positive strand single-stranded RNA virus is a positive strand single-stranded RNA virus having no DNA stage.

22. The method of conferring disease resistance to a transgenic plant of claim 21, wherein the second positive strand single-stranded RNA virus having no DNA stage is selected from the group consisting of a positive strand single-stranded RNA plant virus having no DNA stage and a positive single-stranded RNA animal virus having no DNA stage.

23. The method of conferring disease resistance to a transgenic plant of claim 22, wherein the second positive strand single-stranded RNA plant virus having no DNA stage is selected from the group consisting of a second Bromovirus, a Tobacco etch virus, a Tobacco vein mottle virus, and a Pepper mottle virus.

24. The method of conferring disease resistance to a transgenic plant of claim 23, wherein the second Bromovirus is selected from a second Cowpea chlorotic mottle virus and a second Brome mosaic virus.

25. The method of conferring disease resistance to a transgenic plant of claim 23, wherein the second Bromovirus is a second Cowpea chlorotic mottle virus.

26. The method of conferring disease resistance to a transgenic plant of claim 1, wherein the molar concentration ratio of heterologous polypeptide in a cell provided a stimulus relative to a cell not provided a stimulus is at least about 50:1.

27. The method of conferring disease resistance to a transgenic plant of claim 26, wherein the molar concentration ratio of heterologous polypeptide in a cell provided a stimulus relative to a cell not provided a stimulus is at least about 100:1.

28. The method of conferring disease resistance to a transgenic plant of claim 27, wherein the molar concentration ratio of heterologous polypeptide in a cell provided a stimulus relative to a cell not provided a stimulus is at least about 1000:1.

29. The method of conferring disease resistance to a transgenic plant of claim 28, wherein the molar concentration ratio of heterologous polypeptide in a cell provided a stimulus relative to a cell not provided a stimulus is at least about 10,000:1.

30. A method of producing a heterologous polypeptide in a transgenic plant, the method comprising:

a) providing a transgenic plant comprising a recombinant DNA molecule comprising a promoter operably linked to a DNA sequence comprising, in the 5' to 3' direction,

i) a sequence complementary to a coding sequence for a heterologous polypeptide;

ii) a sequence complementary to an internal ribosome entry site;

iii) a 3' UTR of a first positive strand single-stranded RNA virus;

b) growing the transgenic plant; and

c) providing a stimulus to the transgenic plant for synthesis of an RNA complementary to an RNA transcript of the recombinant DNA.

31. The method of producing a heterologous polypeptide in a transgenic plant of claim 30, wherein the promoter is a selected from the group consisting of a constitutive promoter and an inducible promoter.

32. The method of producing a heterologous polypeptide in a transgenic plant of claim 31, wherein the promoter is a constitutive promoter.

33. The method of producing a heterologous polypeptide in a transgenic plant of claim 32, wherein the constitutive promoter is a eukaryotic constitutive promoter selected from the group consisting of a cauliflower mosaic virus 35S promoter, a blueberry red ringspot virus promoter, a ubiquitin gene promoter, an actin gene promoter, an NeIF-4A10 promoter, a maize Adh1-based pEmu promoter, a barley leaf thionin BTH6 promoter, a cassava vein mosaic virus promoter, a sugarcane bacilliform badnavirus promoter and a histone gene promoter.

34. The method of producing a heterologous polypeptide in a transgenic plant of claim 33, wherein the eukaryotic constitutive promoter is a cauliflower mosaic virus 35S promoter.

35. The recombinant DNA molecule of claim 34, wherein the cauliflower mosaic virus 35S promoter comprises the sequence:

AGATTAGCCTTTTCAATTTCAGAAAGAATGCTAACCCACAGATGGTTAGA
GAGGCTTACGCAGCAGGTCTCATCAAGACGATCTACCCGAGCAATAATCT
CCAGGAAATCAAATACCTTCCCAAGAAGGTTAAAGATGCAGTCAAAAGAT
TCAGGACTAACTGCATCAAGAACACAGAGAAAGATATATTTCTCAAGATC
AGAAGTACTATTCCAGTATGGACGATTCAAGGCTTGCTTCACAAACCAAG
GCAAGTAATAGAGATTGGAGTCTCTAAAAAGGTAGTTCCCACTGAATCAA
AGGCCATGGAGTCAAAGATTCAAATAGAGGACCTAACAGAACTCGCCGTA
AAGACTGGCGAACAGTTCATACAGAGTCTCTTACGACTCAATGACAAGAA
GAAAATCTTCGTCAACATGGTGGAGCACGACACACTTGTCTACTCCAAAA
ATATCAAAGATACAGTCTCAGAAGACCAAAGGGCAATTGAGACTTTTCAA

CAAAGGGTAATATCCGGAAACCTCCTCGGATTCCATTGCCCAGCTATCTGT
CACTTTATTGTGAAGATAGTGGAAAAGGAAGGTGGCTCCTACAAATGCCA
TCATTGCGATAAAGGAAAGGCCATCGTTGAAGATGCCTCTGCCGACAGTG
GTCCCAAAGATGGACCCCCACCCACGAGGAGCATCGTGGAAAAAGAAGA
CGTTCCAACCACGTCTTCAAAGCAAGTGGATTGATGTGATATCTCCACTGA
CGTAAGGGATGACGCACAATCCCACTATCCTTCGCAAGACCCTTCCTCTAT
ATAAGGAAGTTCATTTCATTTGGAGAGAACACG (SEQ ID NO: 3).

36. The method of producing a heterologous polypeptide in a transgenic cell of claim 30, wherein the coding sequence for a heterologous polypeptide encodes a polypeptide selected from the group consisting of a hormone, an enzyme, a cell toxin, a viral polypeptide, a cell surface polypeptide, and an intracellular polypeptide.

37. The method of producing a heterologous polypeptide in a transgenic plant of claim 30, wherein the sequence complementary to an IRES is a sequence complementary to an IRES selected from the group consisting of a picornavirus IRES, a foot-and-mouth disease virus IRES, an encephalomyocarditis virus IRES, a hepatitis A virus IRES, a hepatitis C virus IRES, a human rhinovirus IRES, a poliovirus IRES, a swine vesicular disease virus IRES, a turnip mosaic potyvirus IRES, a human fibroblast growth factor 2 mRNA IRES, a pestivirus IRES, a Leishmania RNA virus IRES, a Moloney murine leukemia virus IRES a human rhinovirus 14 IRES, an aphthovirus IRES, a human immunoglobulin heavy chain binding protein mRNA IRES, a *Drosophila* Antennapedia mRNA IRES, a human fibroblast growth factor 2 mRNA IRES, a hepatitis G virus IRES, a tobamovirus IRES, a vascular endothelial growth factor mRNA IRES, a Coxsackie B group virus IRES, a c-myc protooncogene mRNA IRES, a human MYT2 mRNA IRES, a human parechovirus type 1 virus IRES, a human parechovirus type 2 virus IRES, a eukaryotic initiation factor 4GI mRNA IRES, a Plautia stali intestine virus IRES, a Theiler's murine encephalomyelitis virus IRES, a bovine enterovirus IRES, a connexin 43 mRNA IRES, a homeodomain protein Gtx mRNA IRES, an AML1 transcription factor mRNA IRES, an NF-kappa B repressing factor mRNA IRES, an X-linked inhibitor of apoptosis mRNA IRES, a cricket paralysis virus RNA IRES, a p58(PITSLRE) protein kinase mRNA IRES, an ornithine decarboxylase mRNA IRES, a connexin-32 mRNA IRES, a bovine viral diarrhea virus IRES, an insulin-like growth factor I receptor mRNA IRES, a human immunodeficiency virus type 1 gag gene IRES, a classical swine fever virus IRES, a Kaposi's sarcoma-associated herpes virus IRES, a short

IRES selected from a library of random oligonucleotides, a Jembrana disease virus IRES, an apoptotic protease-activating factor 1 mRNA IRES, a Rhopalosiphum padi virus IRES, a cationic amino acid transporter mRNA IRES, a human insulin-like growth factor II leader 2 mRNA IRES, a giardiavirus IRES, a Smad5 mRNA IRES, a porcine teschovirus-1 talfan IRES, a *Drosophila* Hairless mRNA IRES, an hSNM1 mRNA IRES, a Cbfa1/Runx2 mRNA IRES, an Epstein-Barr virus IRES, a hibiscus chlorotic ringspot virus IRES, a rat pituitary vasopressin V1b receptor mRNA IRES, and a human hsp70 mRNA IRES.

38. The method of producing a heterologous polypeptide in a transgenic plant of claim 37, wherein the sequence complementary to an internal ribosome entry site is a sequence complementary to a picornavirus internal ribosome entry site.

39. The method of producing a heterologous polypeptide in a transgenic plant of claim 38, wherein the sequence complementary to a picornavirus internal ribosome entry site comprises the sequence:

TTATCATCGTGTTTTTCAAAGGAAAACCACGTCCCCGTGGTTCGGGGGGCC
TAGACGTTTTTTTAACCTCGACTAAACACATGTAAAGCATGTGCACCGAG
GCCCCAGATCAGATCCCATACAATGGGGTACCTTCTGGGCATCCTTCAGCC
CCTTGTTGAATACGCTTGAGGAGAGCCATTTGACTCTTTCCACAACTATCC
AACTCACAACGTGGCACTGGGGTTGTGCCGCCTTTGCAGGTGTATCTTATA
CACGTGGCTTTTGGCCGCAGAGGCACCTGTCGCCAGGTGGGGGGTTCCGC
TGCCTGCAAAGGGTCGCTACAGACGTTGTTTGTCTTCAAGAAGCTTCCAGA
GGAACTGCTTCCTTCACGACATTCAACAGACCTTGCATTCCTTTGGCGAGA
GGGGAAAGACCCCTAGGAATGCTCGTCAAGAAGACAGGGCCAGGTTTCC
GGGCCCTCACATTGCCAAAAGACGGCAATATGGTGGAAAATCACATATAG
ACAAACGCACACCGGCCTTATTCCAAGCGGCTTCGGCCAGTAACGTTAGG
GGGGGGGGAGGGAGAGGGGCGGAATT (SEQ ID NO: 6).

40. The method of producing a heterologous polypeptide in a transgenic plant of claim 30, wherein the 3' UTR of a first positive strand single-stranded RNA virus is a 3' UTR of a first positive strand single-stranded RNA virus having no DNA stage.

41. The method of producing a heterologous polypeptide in a transgenic plant of claim 40, wherein the 3' UTR of a first positive strand single-stranded RNA virus having no DNA stage is a 3' UTR of a first bromovirus.

42. The method of producing a heterologous polypeptide in a transgenic plant of claim 41, wherein the 3' UTR of a first bromovirus is a 3' UTR of a first Cowpea chlorotic mottle virus.

43. The method of producing a heterologous polypeptide in a transgenic plant of claim 42, wherein a DNA copy of the 3' UTR of a first Cowpea chlorotic mottle virus comprises the sequence:

AGTGCCCGCTGAAGAGCGTTACACTAGTGTGGCCTACTTGAAGGCTAGTT
ATAACCGTTTCTTTAAACGGTAATCGTTGTTGAAACGTCTTCCTTTTACAA
GAGGATTGAGCTGCCCTTGGGTTTTACTCCTTGAACCCTTCGGAAGAACTC
TTTGGAGTTCGTACCAGTACCTCACATAGTGAGGTAATAAGACTGGTGGG
CAGCGCCTAGTCGAAAGACTAGGTGATCTCTAAGGAGACC (SEQ ID NO: 8).

44. The method of producing a heterologous polypeptide in a transgenic plant of claim 30, further comprising a sequence complementary to an intron.

45. The method of producing a heterologous polypeptide in a transgenic plant of claim 30, further comprising a transcription termination signal.

46. The method of producing a heterologous polypeptide in a transgenic plant of claim 30, wherein the plant is a dicotyledonous plant.

47. The method of producing a heterologous polypeptide in a transgenic plant of claim 46, wherein the dicotyledonous plant is a *Nicotiana* plant.

48. The method of producing a heterologous polypeptide in a transgenic plant of claim 47, wherein the *Nicotiana* plant is a *Nicotiana benthamiana* plant.

49. The method of producing a heterologous polypeptide in a transgenic plant of claim 30, wherein the providing a stimulus to the transgenic plant for synthesis of an RNA complementary to an RNA transcript of the recombinant DNA comprises infecting the transgenic plant with a second positive strand single-stranded RNA virus.

50. The method of producing a heterologous polypeptide in a transgenic plant of claim 49, wherein the second positive strand single-stranded RNA virus is a positive strand single-stranded RNA virus having no DNA stage.

51. The method of producing a heterologous polypeptide in a transgenic plant of claim 50, wherein the second positive strand single-stranded RNA virus having no DNA stage is selected from the group consisting of a positive strand single-

stranded RNA plant virus having no DNA stage and a positive single-stranded RNA animal virus having no DNA stage.

52. The method of producing a heterologous polypeptide in a transgenic plant of claim 51, wherein the second positive strand single-stranded RNA plant virus having no DNA stage is selected from the group consisting of a second Bromovirus, a Tobacco etch virus, a Tobacco vein mottle virus, and a Pepper mottle virus.

53. The method of producing a heterologous polypeptide in a transgenic plant of claim 52, wherein the second Bromovirus is selected from a second Cowpea chlorotic mottle virus and a second Brome mosaic virus.

54. The method of producing a heterologous polypeptide in a transgenic plant of claim 53, wherein the second Bromovirus is a second Cowpea chlorotic mottle virus.

55. The method of producing a heterologous polypeptide in a transgenic plant of claim 30, wherein the providing a stimulus to the cell for synthesis of an RNA complementary to an RNA transcript of the recombinant DNA comprises transfecting the transgenic plant with a cDNA of a second positive strand single-stranded RNA virus.

56. The method of producing a heterologous polypeptide in a transgenic plant of claim 55, wherein the cDNA of a second positive strand single-stranded RNA virus comprises a cDNA encoding an RNA dependent RNA polymerase.

57. The method of producing a heterologous polypeptide in a transgenic plant of claim 56, wherein the second positive strand single-stranded RNA virus is a positive strand single-stranded RNA virus having no DNA stage.

58. The method of producing a heterologous polypeptide in a transgenic plant of claim 57, wherein the second positive strand single-stranded RNA virus having no DNA stage is selected from the group consisting of a positive strand single-stranded RNA plant virus having no DNA stage and a positive single-stranded RNA animal virus having no DNA stage.

59. The method of producing a heterologous polypeptide in a transgenic plant of claim 58, wherein the second positive strand single-stranded RNA plant virus having no DNA stage is selected from the group consisting of a second Bromovirus, a Tobacco etch virus, a Tobacco vein mottle virus, and a Pepper mottle virus.

60. The method of producing a heterologous polypeptide in a transgenic plant of claim 59, wherein the second positive strand single-stranded RNA plant virus

having no DNA stage is selected from the group consisting of a second Cowpea chlorotic mottle virus, a second Brome mosaic virus, a second Tobacco etch virus, a second Tobacco vein mottle virus, and a second Pepper mottle virus.

61. The method of producing a heterologous polypeptide in a transgenic plant of claim 60, wherein the second Bromovirus is selected from a second Cowpea chlorotic mottle virus and a Brome mosaic virus.

62. The method of producing a heterologous polypeptide in a transgenic plant of claim 30, wherein the providing a stimulus to the cell for synthesis of an RNA complementary to an RNA transcript of the recombinant DNA comprises transfecting the transgenic plant with RNA of a second positive strand single-stranded RNA virus, the RNA comprising at least one sequence encoding a polypeptide component of an RNA virus replication complex.

63. The method of producing a heterologous polypeptide in a transgenic plant of claim 62, wherein the RNA comprising at least one sequence encoding a polypeptide component of an RNA virus replication complex is an RNA comprising a sequence encoding an RNA-dependent RNA polymerase.

64. The method of producing a heterologous polypeptide in a transgenic plant of claim 63, wherein the second positive strand single-stranded RNA virus is a positive strand single-stranded RNA virus having no DNA stage.

65. The method of producing a heterologous polypeptide in a transgenic plant of claim 64, wherein the second positive strand single-stranded RNA virus having no DNA stage is selected from the group consisting of a positive strand single-stranded RNA plant virus having no DNA stage and a positive single-stranded RNA animal virus having no DNA stage.

66. The method of producing a heterologous polypeptide in a transgenic plant of claim 65, wherein the second positive strand single-stranded RNA plant virus having no DNA stage is selected from the group consisting of a second Bromovirus, a Tobacco etch virus, a Tobacco vein mottle virus, and a Pepper mottle virus.

67. The method of producing a heterologous polypeptide in a transgenic plant of claim 66, wherein the second Bromovirus is selected from a second Cowpea chlorotic mottle virus and a second Brome mosaic virus.

68. The method of producing a heterologous polypeptide in a transgenic plant of claim 67, wherein the second Bromovirus is a second Cowpea chlorotic mottle virus.

69. The method of producing a heterologous polypeptide in a transgenic plant of claim 30, wherein the molar concentration ratio of heterologous polypeptide in a cell provided a stimulus relative to a cell not provided a stimulus is at least about 50:1.

70. The method of producing a heterologous polypeptide in a transgenic plant of claim 69, wherein the molar concentration ratio of heterologous polypeptide in a cell provided a stimulus relative to a cell not provided a stimulus is at least about 100:1.

71. The method of producing a heterologous polypeptide in a transgenic plant of claim 70, wherein the molar concentration ratio of heterologous polypeptide in a cell provided a stimulus relative to a cell not provided a stimulus is at least about 1000:1.

72. The method of producing a heterologous polypeptide in a transgenic plant of claim 71, wherein the molar concentration ratio of heterologous polypeptide in a cell provided a stimulus relative to a cell not provided a stimulus is at least about 10,000:1.

73. A method of producing a heterologous polypeptide in a transgenic cell, the method comprising:

a) providing a cell comprising a recombinant DNA molecule comprising a promoter operably linked to a DNA sequence comprising, in the 5' to 3' direction,

i) a sequence complementary to a coding sequence for a heterologous polypeptide;

ii) a sequence complementary to an internal ribosome entry site;

iii) a 3' UTR of a first positive strand single-stranded RNA virus; and

b) providing a stimulus to the cell for synthesis of an RNA complementary to an RNA transcript of the recombinant DNA.

74. The method of producing a heterologous polypeptide in a transgenic cell of claim 73, wherein the promoter is a selected from the group consisting of a constitutive promoter and an inducible promoter.

75. The method of producing a heterologous polypeptide in a transgenic cell of claim 74, wherein the promoter is a constitutive promoter.

76. The method of producing a heterologous polypeptide in a transgenic cell of claim 75, wherein the constitutive promoter is a eukaryotic constitutive promoter selected from the group consisting of a cauliflower mosaic virus 35S promoter, a blueberry red ringspot virus promoter, a ubiquitin gene promoter, an actin gene promoter, an NeIF-4A10 promoter, a maize Adh1-based pEmu promoter, a barley leaf thionin BTH6 promoter, a cassava vein mosaic virus promoter, a sugarcane bacilliform badnavirus promoter and a histone gene promoter.

77. The method of producing a heterologous polypeptide in a transgenic cell of claim 76, wherein the eukaryotic constitutive promoter is a cauliflower mosaic virus 35S promoter.

78. The method of producing a heterologous polypeptide in a transgenic plant of claim 77, wherein the cauliflower mosaic virus 35S promoter comprises the sequence:

AGATTAGCCTTTTCAATTTCAGAAAGAATGCTAACCCACAGATGGTTAGA
GAGGCTTACGCAGCAGGTCTCATCAAGACGATCTACCCGAGCAATAATCT
CCAGGAAATCAAATACCTTCCCAAGAAGGTTAAAGATGCAGTCAAAAGAT
TCAGGACTAACTGCATCAAGAACACAGAGAAAGATATATTTCTCAAGATC
AGAAGTACTATTCCAGTATGGACGATTCAAGGCTTGCTTCACAAACCAAG
GCAAGTAATAGAGATTGGAGTCTCTAAAAAGGTAGTTCCCACTGAATCAA
AGGCCATGGAGTCAAAGATTCAAATAGAGGACCTAACAGAACTCGCCGTA
AAGACTGGCGAACAGTTCATACAGAGTCTCTTACGACTCAATGACAAGAA
GAAAATCTTCGTCAACATGGTGGAGCACGACACACTTGTCTACTCCAAAA
ATATCAAAGATACAGTCTCAGAAGACCAAAGGGCAATTGAGACTTTTCAA
CAAAGGGTAATATCCGGAAACCTCCTCGGATTCCATTGCCCAGCTATCTGT
CACTTTATTGTGAAGATAGTGGAAAAGGAAGGTGGCTCCTACAAATGCCA
TCATTGCGATAAAGGAAAGGCCATCGTTGAAGATGCCTCTGCCGACAGTG
GTCCCAAAGATGGACCCCCACCCACGAGGAGCATCGTGGAAAAAGAAGA
CGTTCCAACCACGTCTTCAAAGCAAGTGGATTGATGTGATATCTCCACTGA
CGTAAGGGATGACGCACAATCCCACTATCCTTCGCAAGACCCTTCCTCTAT
ATAAGGAAGTTCATTTCATTTGGAGAGAACACG (SEQ ID NO: 3).

79. The method of producing a heterologous polypeptide in a transgenic cell of claim 73, wherein the coding sequence for a heterologous polypeptide encodes a polypeptide selected from the group consisting of a hormone, an enzyme, a cell toxin, a viral polypeptide, a cell surface polypeptide, and an intracellular polypeptide.

80. The method of producing a heterologous polypeptide in a transgenic cell of claim 73, wherein the sequence complementary to an IRES is a sequence complementary to an IRES selected from the group consisting of a picornavirus IRES, a foot-and-mouth disease virus IRES, an encephalomyocarditis virus IRES, a hepatitis A virus IRES, a hepatitis C virus IRES, a human rhinovirus IRES, a poliovirus IRES, a swine vesicular disease virus IRES, a turnip mosaic potyvirus IRES, a human fibroblast growth factor 2 mRNA IRES, a pestivirus IRES, a Leishmania RNA virus IRES, a Moloney murine leukemia virus IRES a human rhinovirus 14 IRES, an aphthovirus IRES, a human immunoglobulin heavy chain binding protein mRNA IRES, a *Drosophila* Antennapedia mRNA IRES, a human fibroblast growth factor 2 mRNA IRES, a hepatitis G virus IRES, a tobamovirus IRES, a vascular endothelial growth factor mRNA IRES, a Coxsackie B group virus IRES, a c-myc protooncogene mRNA IRES, a human MYT2 mRNA IRES, a human parechovirus type 1 virus IRES, a human parechovirus type 2 virus IRES, a eukaryotic initiation factor 4GI mRNA IRES, a Plautia stali intestine virus IRES, a Theiler's murine encephalomyelitis virus IRES, a bovine enterovirus IRES, a connexin 43 mRNA IRES, a homeodomain protein Gtx mRNA IRES, an AML1 transcription factor mRNA IRES, an NF-kappa B repressing factor mRNA IRES, an X-linked inhibitor of apoptosis mRNA IRES, a cricket paralysis virus RNA IRES, a p58(PITSLRE) protein kinase mRNA IRES, an ornithine decarboxylase mRNA IRES, a connexin-32 mRNA IRES, a bovine viral diarrhea virus IRES, an insulin-like growth factor I receptor mRNA IRES, a human immunodeficiency virus type 1 gag gene IRES, a classical swine fever virus IRES, a Kaposi's sarcoma-associated herpes virus IRES, a short IRES selected from a library of random oligonucleotides, a Jembrana disease virus IRES, an apoptotic protease-activating factor 1 mRNA IRES, a Rhopalosiphum padi virus IRES, a cationic amino acid transporter mRNA IRES, a human insulin-like growth factor II leader 2 mRNA IRES, a giardiavirus IRES, a Smad5 mRNA IRES, a porcine teschovirus-1 talfan IRES, a *Drosophila* Hairless mRNA IRES, an hSNM1 mRNA IRES, a Cbfa1/Runx2 mRNA IRES, an Epstein-Barr virus IRES, a hibiscus chlorotic ringspot virus IRES, a rat pituitary vasopressin V1b receptor mRNA IRES, and a human hsp70 mRNA IRES.

81. The method of producing a heterologous polypeptide in a transgenic cell of claim 80, wherein the sequence complementary to an internal ribosome entry site is a sequence complementary to a picornavirus internal ribosome entry site.

82. The method of producing a heterologous polypeptide in a transgenic cell of claim 81, wherein the sequence complementary to a picornavirus internal ribosome entry site comprises the sequence:

TTATCATCGTGTTTTTCAAAGGAAAACCACGTCCCCGTGGTTCGGGGGGCC
TAGACGTTTTTTTAACCTCGACTAAACACATGTAAAGCATGTGCACCGAG
GCCCCAGATCAGATCCCATACAATGGGGTACCTTCTGGGCATCCTTCAGCC
CCTTGTTGAATACGCTTGAGGAGAGCCATTTGACTCTTTCCACAACTATCC
AACTCACAACGTGGCACTGGGGTTGTGCCGCCTTTGCAGGTGTATCTTATA
CACGTGGCTTTTGGCCGCAGAGGCACCTGTCGCCAGGTGGGGGGTTCCGC
TGCCTGCAAAGGGTCGCTACAGACGTTGTTTGTCTTCAAGAAGCTTCCAGA
GGAACTGCTTCCTTCACGACATTCAACAGACCTTGCATTCCTTTGGCGAGA
GGGGAAAGACCCCTAGGAATGCTCGTCAAGAAGACAGGGCCAGGTTTCC
GGGCCCTCACATTGCCAAAAGACGGCAATATGGTGGAAAATCACATATAG
ACAAACGCACACCGGCCTTATTCCAAGCGGCTTCGGCCAGTAACGTTAGG
GGGGGGGGAGGGAGAGGGGCGGAATT (SEQ ID NO: 6).

83. The method of producing a heterologous polypeptide in a transgenic cell of claim 73, wherein the 3' UTR of a first positive strand single-stranded RNA virus is a 3' UTR of a first positive strand single-stranded RNA virus having no DNA stage.

84. The method of producing a heterologous polypeptide in a transgenic cell of claim 83, wherein the 3' UTR of a first positive strand single-stranded RNA virus having no DNA stage is a 3' UTR of a first bromovirus.

85. The method of producing a heterologous polypeptide in a transgenic cell of claim 84, wherein the 3' UTR of a first bromovirus is a 3' UTR of a first Cowpea chlorotic mottle virus.

86. The method of producing a heterologous polypeptide in a transgenic cell of claim 85, wherein a DNA copy of the 3' UTR of a first Cowpea chlorotic mottle virus comprises the sequence:

AGTGCCCGCTGAAGAGCGTTACACTAGTGTGGCCTACTTGAAGGCTAGTT
ATAACCGTTTCTTTAAACGGTAATCGTTGTTGAAACGTCTTCCTTTTACAA
GAGGATTGAGCTGCCCTTGGGTTTTACTCCTTGAACCCTTCGGAAGAACTC
TTTGGAGTTCGTACCAGTACCTCACATAGTGAGGTAATAAGACTGGTGGG
CAGCGCCTAGTCGAAAGACTAGGTGATCTCTAAGGAGACC (SEQ ID NO: 8).

87. The method of producing a heterologous polypeptide in a transgenic cell of claim 73, further comprising a sequence complementary to an intron.

88. The method of producing a heterologous polypeptide in a transgenic cell of claim 73, further comprising a transcription termination signal.

89. The method of producing a heterologous polypeptide in a transgenic cell of claim 73, wherein the recombinant DNA molecule is comprised by a host cell.

90. The method of producing a heterologous polypeptide in a transgenic cell of claim 89, wherein the host cell is a plant cell.

91. The method of producing a heterologous polypeptide in a transgenic cell of claim 90, wherein the plant cell is comprised by a plant.

92. The method of producing a heterologous polypeptide in a transgenic cell of claim 91, wherein the plant is a dicotyledonous plant.

93. The method of producing a heterologous polypeptide in a transgenic cell of claim 92, wherein the dicotyledonous plant is a *Nicotiana* plant.

94. The method of producing a heterologous polypeptide in a transgenic cell of claim 93, wherein the *Nicotiana* plant is a *Nicotiana benthamiana* plant.

95. The method of producing a heterologous polypeptide in a transgenic cell of claim 73, wherein the providing a stimulus to the cell for synthesis of an RNA complementary to an RNA transcript of the recombinant DNA comprises infecting the transgenic cell with a second positive strand single-stranded RNA virus.

96. The method of producing a heterologous polypeptide in a transgenic cell of claim 95, wherein the second positive strand single-stranded RNA virus is a positive strand single-stranded RNA virus having no DNA stage.

97. The method of producing a heterologous polypeptide in a transgenic cell of claim 96, wherein the second positive strand single-stranded RNA virus having no DNA stage is selected from the group consisting of a positive strand single-stranded RNA plant virus having no DNA stage and a positive single-stranded RNA animal virus having no DNA stage.

98. The method of producing a heterologous polypeptide in a transgenic cell of claim 97, wherein the second positive strand single-stranded RNA plant virus having no DNA stage is selected from the group consisting of a second Bromovirus, a Tobacco etch virus, a Tobacco vein mottle virus, and a Pepper mottle virus.

99. The method of producing a heterologous polypeptide in a transgenic cell of claim 98, wherein the second Bromovirus is selected from a second Cowpea chlorotic mottle virus and a second Brome mosaic virus.

100. The method of producing a heterologous polypeptide in a transgenic cell of claim 99, wherein the second Bromovirus is a second Cowpea chlorotic mottle virus.

101. The method of producing a heterologous polypeptide in a transgenic cell of claim 73, wherein the providing a stimulus to the cell for synthesis of an RNA complementary to an RNA transcript of the recombinant DNA comprises transfecting the transgenic cell with a cDNA of a second positive strand single-stranded RNA virus.

102. The method of producing a heterologous polypeptide in a transgenic cell of claim 101, wherein the cDNA of a second positive strand single-stranded RNA virus comprises a cDNA encoding an RNA dependent RNA polymerase.

103. The method of producing a heterologous polypeptide in a transgenic cell of claim 101, wherein the second positive strand single-stranded RNA virus is a positive strand single-stranded RNA virus having no DNA stage.

104. The method of producing a heterologous polypeptide in a transgenic cell of claim 103, wherein the second positive strand single-stranded RNA virus having no DNA stage is selected from the group consisting of a positive strand single-stranded RNA plant virus having no DNA stage and a positive single-stranded RNA animal virus having no DNA stage.

105. The method of producing a heterologous polypeptide in a transgenic cell of claim 104, wherein the second positive strand single-stranded RNA plant virus having no DNA stage is selected from the group consisting of a second Bromovirus, a Tobacco etch virus, a Tobacco vein mottle virus, and a Pepper mottle virus.

106. The method of producing a heterologous polypeptide in a transgenic cell of claim 105, wherein the second positive strand single-stranded RNA plant virus having no DNA stage is selected from the group consisting of a second Cowpea chlorotic mottle virus, a second Brome mosaic virus, a second Tobacco etch virus, a second Tobacco vein mottle virus, and a second Pepper mottle virus.

107. The method of producing a heterologous polypeptide in a transgenic cell of claim 106, wherein the second Bromovirus is selected from a second Cowpea chlorotic mottle virus and a Brome mosaic virus.

108. The method of producing a heterologous polypeptide in a transgenic cell of claim 73, wherein the providing a stimulus to the cell for synthesis of an RNA complementary to an RNA transcript of the recombinant DNA comprises transfecting the transgenic cell with RNA of a second positive strand single-stranded RNA virus, the RNA comprising at least one sequence encoding a polypeptide component of an RNA virus replication complex.

109. The method of producing a heterologous polypeptide in a transgenic cell of claim 108, wherein the RNA comprising at least one sequence encoding a polypeptide component of an RNA virus replication complex is an RNA comprising a sequence encoding an RNA-dependent RNA polymerase.

110. The method of producing a heterologous polypeptide in a transgenic cell of claim 109, wherein the second positive strand single-stranded RNA virus is a positive strand single-stranded RNA virus having no DNA stage.

111. The method of producing a heterologous polypeptide in a transgenic cell of claim 110, wherein the second positive strand single-stranded RNA virus having no DNA stage is selected from the group consisting of a positive strand single-stranded RNA plant virus having no DNA stage and a positive single-stranded RNA animal virus having no DNA stage.

112. The method of producing a heterologous polypeptide in a transgenic cell of claim 111, wherein the second positive strand single-stranded RNA plant virus having no DNA stage is selected from the group consisting of a second Bromovirus, a Tobacco etch virus, a Tobacco vein mottle virus, and a Pepper mottle virus.

113. The method of producing a heterologous polypeptide in a transgenic cell of claim 112, wherein the second Bromovirus is selected from a second Cowpea chlorotic mottle virus and a second Brome mosaic virus.

114. The method of producing a heterologous polypeptide in a transgenic cell of claim 113, wherein the second Bromovirus is a second Cowpea chlorotic mottle virus.

115. The method of producing a heterologous polypeptide in a transgenic cell of claim 73, wherein the molar concentration ratio of heterologous polypeptide in a cell provided a stimulus relative to a cell not provided a stimulus is at least about 50:1.

116. The method of producing a heterologous polypeptide in a transgenic cell of claim 115, wherein the molar concentration ratio of heterologous polypeptide

in a cell provided a stimulus relative to a cell not provided a stimulus is at least about 100:1.

117. The method of producing a heterologous polypeptide in a transgenic cell of claim 116, wherein the molar concentration ratio of heterologous polypeptide in a cell provided a stimulus relative to a cell not provided a stimulus is at least about 1000:1.

118. The method of producing a heterologous polypeptide in a transgenic cell of claim 117, wherein the molar concentration ratio of heterologous polypeptide in a cell provided a stimulus relative to a cell not provided a stimulus is at least about 10,000:1.

119. A recombinant DNA molecule comprising a promoter operably linked to a DNA sequence comprising, in the 5' to 3' direction:

a) a sequence complementary to a coding sequence for a heterologous polypeptide;

b) a sequence complementary to an internal ribosome entry site; and

c) a 3' UTR of a positive strand single-stranded RNA virus.

120. The recombinant DNA molecule of claim 119, wherein the promoter is a selected from the group consisting of a constitutive promoter and an inducible promoter.

121. The recombinant DNA molecule of claim 120, wherein the promoter is a constitutive promoter.

122. The recombinant DNA molecule of claim 121, wherein the constitutive promoter is a eukaryotic constitutive promoter selected from the group consisting of a cauliflower mosaic virus 35S promoter, a blueberry red ringspot virus promoter, a ubiquitin gene promoter, an actin gene promoter, an NeIF-4A10 promoter, a maize Adh1-based pEmu promoter, a barley leaf thionin BTH6 promoter, a cassava vein mosaic virus promoter, a sugarcane bacilliform badnavirus promoter and a histone gene promoter.

123. The recombinant DNA molecule of claim 122, wherein the eukaryotic constitutive promoter is a cauliflower mosaic virus 35S promoter.

124. The recombinant DNA molecule of claim 123, wherein the cauliflower mosaic virus 35S promoter comprises the sequence:

AGATTAGCCTTTTCAATTTCAGAAAGAATGCTAACCCACAGATGGTTAGA

GAGGCTTACGCAGCAGGTCTCATCAAGACGATCTACCCGAGCAATAATCT
CCAGGAAATCAAATACCTTCCCAAGAAGGTTAAAGATGCAGTCAAAAGAT
TCAGGACTAACTGCATCAAGAACACAGAGAAAGATATATTTCTCAAGATC
AGAAGTACTATTCCAGTATGGACGATTCAAGGCTTGCTTCACAAACCAAG
GCAAGTAATAGAGATTGGAGTCTCTAAAAAGGTAGTTCCCACTGAATCAA
AGGCCATGGAGTCAAAGATTCAAATAGAGGACCTAACAGAACTCGCCGTA
AAGACTGGCGAACAGTTCATACAGAGTCTCTTACGACTCAATGACAAGAA
GAAAATCTTCGTCAACATGGTGGAGCACGACACACTTGTCTACTCCAAAA
ATATCAAAGATACAGTCTCAGAAGACCAAAGGGCAATTGAGACTTTTCAA
CAAAGGGTAATATCCGGAAACCTCCTCGGATTCCATTGCCCAGCTATCTGT
CACTTTATTGTGAAGATAGTGGAAAAGGAAGGTGGCTCCTACAAATGCCA
TCATTGCGATAAAGGAAAGGCCATCGTTGAAGATGCCTCTGCCGACAGTG
GTCCCAAAGATGGACCCCCACCCACGAGGAGCATCGTGGAAAAAGAAGA
CGTTCCAACCACGTCTTCAAAGCAAGTGGATTGATGTGATATCTCCACTGA
CGTAAGGGATGACGCACAATCCCACTATCCTTCGCAAGACCCTTCCTCTAT
ATAAGGAAGTTCATTTCATTTGGAGAGAACACG (SEQ ID NO: 3).

125. The recombinant DNA molecule of claim 119, wherein the coding sequence for a heterologous polypeptide encodes a polypeptide selected from the group consisting of a hormone, an enzyme, a cell toxin, a viral polypeptide, a cell surface polypeptide, and an intracellular polypeptide.

126. The recombinant DNA molecule of claim 119, wherein the sequence complementary to an internal ribosome entry site is a sequence complementary to an IRES selected from the group consisting of a picornavirus IRES, a foot-and-mouth disease virus IRES, an encephalomyocarditis virus IRES, a hepatitis A virus IRES, a hepatitis C virus IRES, a human rhinovirus IRES, a poliovirus IRES, a swine vesicular disease virus IRES, a turnip mosaic potyvirus IRES, a human fibroblast growth factor 2 mRNA IRES, a pestivirus IRES, a Leishmania RNA virus IRES, a Moloney murine leukemia virus IRES a human rhinovirus 14 IRES, an aphthovirus IRES, a human immunoglobulin heavy chain binding protein mRNA IRES, a *Drosophila* Antennapedia mRNA IRES, a human fibroblast growth factor 2 mRNA IRES, a hepatitis G virus IRES, a tobamovirus IRES, a vascular endothelial growth factor mRNA IRES, a Coxsackie B group virus IRES, a c-myc protooncogene mRNA IRES, a human MYT2 mRNA IRES, a human parechovirus type 1 virus IRES, a human parechovirus type 2 virus IRES, a eukaryotic initiation factor 4GI mRNA

IRES, a Plautia stali intestine virus IRES, a Theiler's murine encephalomyelitis virus IRES, a bovine enterovirus IRES, a connexin 43 mRNA IRES, a homeodomain protein Gtx mRNA IRES, an AML1 transcription factor mRNA IRES, an NF-kappa B repressing factor mRNA IRES, an X-linked inhibitor of apoptosis mRNA IRES, a cricket paralysis virus RNA IRES, a p58(PITSLRE) protein kinase mRNA IRES, an ornithine decarboxylase mRNA IRES, a connexin-32 mRNA IRES, a bovine viral diarrhea virus IRES, an insulin-like growth factor I receptor mRNA IRES, a human immunodeficiency virus type 1 gag gene IRES, a classical swine fever virus IRES, a Kaposi's sarcoma-associated herpes virus IRES, a short IRES selected from a library of random oligonucleotides, a Jembrana disease virus IRES, an apoptotic protease-activating factor 1 mRNA IRES, a Rhopalosiphum padi virus IRES, a cationic amino acid transporter mRNA IRES, a human insulin-like growth factor II leader 2 mRNA IRES, a giardiavirus IRES, a Smad5 mRNA IRES, a porcine teschovirus-1 talfan IRES, a *Drosophila* Hairless mRNA IRES, an hSNM1 mRNA IRES, a Cbfa1/Runx2 mRNA IRES, an Epstein-Barr virus IRES, a hibiscus chlorotic ringspot virus IRES, a rat pituitary vasopressin V1b receptor mRNA IRES, and a human hsp70 mRNA IRES.

127. The recombinant DNA molecule of claim 126, wherein the sequence complementary to an internal ribosome entry site is a sequence complementary to a picornavirus internal ribosome entry site.

128. The recombinant DNA molecule of claim 127, wherein the sequence complementary to a picornavirus internal ribosome entry site comprises the sequence:
TTATCATCGTGTTTTTCAAAGGAAAACCACGTCCCCGTGGTTCGGGGGGCC
TAGACGTTTTTTTAACCTCGACTAAACACATGTAAAGCATGTGCACCGAG
GCCCCAGATCAGATCCCATACAATGGGGTACCTTCTGGGCATCCTTCAGCC
CCTTGTTGAATACGCTTGAGGAGAGCCATTTGACTCTTTCCACAACTATCC
AACTCACAACGTGGCACTGGGGTTGTGCCGCCTTTGCAGGTGTATCTTATA
CACGTGGCTTTTGGCCGCAGAGGCACCTGTCGCCAGGTGGGGGGTTCCGC
TGCCTGCAAAGGGTCGCTACAGACGTTGTTTGTCTTCAAGAAGCTTCCAGA
GGAACTGCTTCCTTCACGACATTCAACAGACCTTGCATTCCTTTGGCGAGA
GGGGAAAGACCCCTAGGAATGCTCGTCAAGAAGACAGGGCCAGGTTTCC
GGGCCCTCACATTGCCAAAAGACGGCAATATGGTGGAAAATCACATATAG
ACAAACGCACACCGGCCTTATTCCAAGCGGCTTCGGCCAGTAACGTTAGG
GGGGGGGGAGGGAGAGGGGCGGAATT (SEQ ID NO: 6).

129. The recombinant DNA molecule of claim 119, wherein the 3' UTR of a positive strand single-stranded RNA virus is a 3' UTR of a positive strand single-stranded RNA virus having no DNA stage.

130. The recombinant DNA molecule of claim 129, wherein the 3' UTR of a positive strand single-stranded RNA virus having no DNA stage is a 3' UTR of a bromovirus.

131. The recombinant DNA molecule of claim 130, wherein the 3' UTR of a bromovirus is a 3' UTR of a Cowpea chlorotic mottle virus.

132. The recombinant DNA molecule of claim 131, wherein a DNA copy of the 3' UTR of a Cowpea chlorotic mottle virus comprises the sequence: AGTGCCCGCTGAAGAGCGTTACACTAGTGTGGCCTACTTGAAGGCTAGTT ATAACCGTTTCTTTAAACGGTAATCGTTGTTGAAACGTCTTCCTTTTACAA GAGGATTGAGCTGCCCTTGGGTTTTACTCCTTGAACCCTTCGGAAGAACTC TTTGGAGTTCGTACCAGTACCTCACATAGTGAGGTAATAAGACTGGTGGG CAGCGCCTAGTCGAAAGACTAGGTGATCTCTAAGGAGACC (SEQ ID NO: 8).

133. The recombinant DNA molecule of claim 119, further comprising a sequence complementary to an intron.

134. The recombinant DNA molecule of claim 119, further comprising a transcription termination signal.

135. A transgenic host cell comprising the recombinant DNA molecule of claim 119.

136. The transgenic host cell of claim 134, wherein the transgenic host cell is a transgenic plant cell.

137. A transgenic plant comprising the transgenic plant cell of claim 136.

138. The transgenic plant of claim 137, wherein the transgenic plant is a transgenic dicotyledonous plant.

139. The transgenic dicotyledonous plant of claim 138, wherein the transgenic dicotyledonous plant is a transgenic *Nicotiana* plant.

140. The transgenic *Nicotiana* plant of claim 139, wherein the transgenic *Nicotiana* plant is a transgenic *Nicotiana benthamiana* plant.

141. Transgenic seed comprising the recombinant DNA molecule of claim 119.

142. A recombinant RNA molecule comprising, in the 5' to 3' direction:

a) an RNA sequence comprising a sequence complementary to a coding sequence for a heterologous polypeptide;

b) a sequence complementary to an internal ribosome entry site; and

c) a 3' UTR of a positive strand single-stranded RNA virus.

143. The recombinant RNA molecule of claim 142, wherein the coding sequence for a heterologous polypeptide encodes a polypeptide selected from the group consisting of a hormone, an enzyme, a cell toxin, a viral polypeptide, a cell surface polypeptide, and an intracellular polypeptide.

144. The recombinant RNA molecule of claim 142, wherein the sequence complementary to an internal ribosome entry site is a sequence complementary to an IRES selected from the group consisting of a picornavirus IRES, a foot-and-mouth disease virus IRES, an encephalomyocarditis virus IRES, a hepatitis A virus IRES, a hepatitis C virus IRES, a human rhinovirus IRES, a poliovirus IRES, a swine vesicular disease virus IRES, a turnip mosaic potyvirus IRES, a human fibroblast growth factor 2 mRNA IRES, a pestivirus IRES, a Leishmania RNA virus IRES, a Moloney murine leukemia virus IRES a human rhinovirus 14 IRES, an aphthovirus IRES, a human immunoglobulin heavy chain binding protein mRNA IRES, a *Drosophila* Antennapedia mRNA IRES, a human fibroblast growth factor 2 mRNA IRES, a hepatitis G virus IRES, a tobamovirus IRES, a vascular endothelial growth factor mRNA IRES, a Coxsackie B group virus IRES, a c-myc protooncogene mRNA IRES, a human MYT2 mRNA IRES, a human parechovirus type 1 virus IRES, a human parechovirus type 2 virus IRES, a eukaryotic initiation factor 4GI mRNA IRES, a Plautia stali intestine virus IRES, a Theiler's murine encephalomyelitis virus IRES, a bovine enterovirus IRES, a connexin 43 mRNA IRES, a homeodomain protein Gtx mRNA IRES, an AML1 transcription factor mRNA IRES, an NF-kappa B repressing factor mRNA IRES, an X-linked inhibitor of apoptosis mRNA IRES, a cricket paralysis virus RNA IRES, a p58(PITSLRE) protein kinase mRNA IRES, an ornithine decarboxylase mRNA IRES, a connexin-32 mRNA IRES, a bovine viral diarrhea virus IRES, an insulin-like growth factor I receptor mRNA IRES, a human immunodeficiency virus type 1 gag gene IRES, a classical swine fever virus IRES, a Kaposi's sarcoma-associated herpes virus IRES, a short IRES selected from a library of random oligonucleotides, a Jembrana disease virus IRES, an apoptotic protease-activating factor 1 mRNA IRES, a Rhopalosiphum padi virus IRES, a cationic amino

acid transporter mRNA IRES, a human insulin-like growth factor II leader 2 mRNA IRES, a giardiavirus IRES, a Smad5 mRNA IRES, a porcine teschovirus-1 talfan IRES, a *Drosophila* Hairless mRNA IRES, an hSNM1 mRNA IRES, a Cbfa1/Runx2 mRNA IRES, an Epstein-Barr virus IRES, a hibiscus chlorotic ringspot virus IRES, a rat pituitary vasopressin V1b receptor mRNA IRES, and a human hsp70 mRNA IRES.

145. The recombinant RNA molecule of claim 144, wherein the sequence complementary to an internal ribosome entry site is a sequence complementary to a picornavirus internal ribosome entry site.

146. The recombinant RNA molecule of claim 145, wherein the sequence complementary to a picornavirus internal ribosome entry site comprises the sequence:
UUAUCAUCGUGUUUUUCAAAGGAAAACCACGUCCCCGUGGUUCGGGGG
GCCUAGACGUUUUUUUUAACCUCGACUAAACACAUGUAAAGCAUGUGCA
CCGAGGCCCCAGAUCAGAUCCCAUACAAUGGGGUACCUUCUGGGCAUCC
UUCAGCCCCUUGUUGAAUACGCUUGAGGAGAGCCAUUUGACUCUUUCC
ACAACUAUCCAACUCACAACGUGGCACUGGGGUUGUGCCGCCUUUGCAG
GUGUAUCUUAUACACGUGGCUUUUGGCCGCAGAGGCACCUGUCGCCAG
GUGGGGGGUUCCGCUGCCUGCAAAGGGUCGCUACAGACGUUGUUUGUC
UUCAAGAAGCUUCCAGAGGAACUGCUUCCUUCACGACAUUCAACAGACC
UUGCAUUCCUUUGGCGAGAGGGGAAAGACCCCUAGGAAUGCUCGUCAA
GAAGACAGGGCCAGGUUUCCGGGCCCUCACAUUGCCAAAAGACGGCAAU
AUGGUGGAAAAUCACAUAUAGACAAACGCACACCGGCCUUAUUCCAAG
CGGCUUCGGCCAGUAACGUUAGGGGGGGGGGAGGGAGAGGGGCGGAAU
U (SEQ ID NO: 7).

147. The recombinant RNA molecule of claim 142, wherein the 3' UTR of a positive strand single-stranded RNA virus is a 3' UTR of a positive strand single-stranded RNA virus having no DNA stage.

148. The recombinant RNA molecule of claim 147, wherein the 3' UTR of a positive strand single-stranded RNA virus having no DNA stage is a 3' UTR of a bromovirus

149. The recombinant RNA molecule of claim 148, wherein the 3' UTR of a bromovirus is a 3' UTR of a Cowpea chlorotic mottle virus.

150. The recombinant RNA molecule of claim 149, wherein an RNA copy of the 3' UTR of a Cowpea chlorotic mottle virus comprises the sequence:

AGUGCCCGCUGAAGAGCGUUACACUAGUGUGGCCUACUUGAAGGCUAG
UUAUAACCGUUUCUUUAAACGGUAAUCGUUGUUGAAACGUCUUCCUUU
UACAAGAGGAUUGAGCUGCCCUUGGGUUUUACUCCUUGAACCCUUCGG
AAGAACUCUUUGGAGUUCGUACCAGUACCUCACAUAGUGAGGUAAUAA
GACUGGUGGGCAGCGCCUAGUCGAAAGACUAGGUGAUCUCUAAGGAGA
CC (SEQ ID NO: 9).

151. The recombinant RNA molecule of claim 142, further comprising a sequence complementary to an intron.

152. A transgenic host cell comprising the recombinant RNA molecule of claim 142.

153. The transgenic host cell of claim 152, wherein the transgenic host cell is a transgenic plant cell.

154. A transgenic plant comprising the transgenic plant cell of claim 153.

155. The transgenic plant of claim 154, wherein the transgenic plant is a transgenic dicotyledonous plant.

156. The transgenic dicotyledonous plant 155, wherein the transgenic dicotyledonous plant is a transgenic *Nicotiana* plant.

157. The transgenic *Nicotiana* plant of claim 155, wherein the transgenic *Nicotiana* plant is a transgenic *Nicotiana benthamiana* plant.

158. Transgenic seed comprising the recombinant RNA of claim 142.

159. An RNA complement of a recombinant RNA molecule, the complement comprising, in the 5' to 3' direction:

a) a sequence complementary to a 3' UTR of a positive strand single-stranded RNA virus;

b) an internal ribosome entry site; and

c) an RNA sequence encoding a heterologous polypeptide.

160. The RNA complement of a recombinant RNA molecule of claim 159, wherein the RNA sequence encoding a heterologous polypeptide encodes a polypeptide selected from the group consisting of a hormone, an enzyme, a cell toxin, a viral polypeptide, a cell surface polypeptide, and an intracellular polypeptide.

161. The RNA complement of a recombinant RNA molecule of claim 159, wherein the internal ribosome entry site is selected from the group consisting of a picornavirus IRES, a foot-and-mouth disease virus IRES, an encephalomyocarditis virus IRES, a hepatitis A virus IRES, a hepatitis C virus IRES, a human rhinovirus

IRES, a poliovirus IRES, a swine vesicular disease virus IRES, a turnip mosaic potyvirus IRES, a human fibroblast growth factor 2 mRNA IRES, a pestivirus IRES, a Leishmania RNA virus IRES, a Moloney murine leukemia virus IRES a human rhinovirus 14 IRES, an aphthovirus IRES, a human immunoglobulin heavy chain binding protein mRNA IRES, a *Drosophila* Antennapedia mRNA IRES, a human fibroblast growth factor 2 mRNA IRES, a hepatitis G virus IRES, a tobamovirus IRES, a vascular endothelial growth factor mRNA IRES, a Coxsackie B group virus IRES, a c-myc protooncogene mRNA IRES, a human MYT2 mRNA IRES, a human parechovirus type 1 virus IRES, a human parechovirus type 2 virus IRES, a eukaryotic initiation factor 4GI mRNA IRES, a Plautia stali intestine virus IRES, a Theiler's murine encephalomyelitis virus IRES, a bovine enterovirus IRES, a connexin 43 mRNA IRES, a homeodomain protein Gtx mRNA IRES, an AML1 transcription factor mRNA IRES, an NF-kappa B repressing factor mRNA IRES, an X-linked inhibitor of apoptosis mRNA IRES, a cricket paralysis virus RNA IRES, a p58(PITSLRE) protein kinase mRNA IRES, an ornithine decarboxylase mRNA IRES, a connexin-32 mRNA IRES, a bovine viral diarrhea virus IRES, an insulin-like growth factor I receptor mRNA IRES, a human immunodeficiency virus type 1 gag gene IRES, a classical swine fever virus IRES, a Kaposi's sarcoma-associated herpes virus IRES, a short IRES selected from a library of random oligonucleotides, a Jembrana disease virus IRES, an apoptotic protease-activating factor 1 mRNA IRES, a Rhopalosiphum padi virus IRES, a cationic amino acid transporter mRNA IRES, a human insulin-like growth factor II leader 2 mRNA IRES, a giardiavirus IRES, a Smad5 mRNA IRES, a porcine teschovirus-1 talfan IRES, a *Drosophila* Hairless mRNA IRES, an hSNM1 mRNA IRES, a Cbfa1/Runx2 mRNA IRES, an Epstein-Barr virus IRES, a hibiscus chlorotic ringspot virus IRES, a rat pituitary vasopressin V1b receptor mRNA IRES, and a human hsp70 mRNA IRES.

162. The RNA complement of a recombinant RNA molecule of claim 161, wherein the internal ribosome entry site is a picornavirus internal ribosome entry site.

163. The RNA complement of a recombinant RNA molecule of claim 162, wherein the picornavirus internal ribosome entry site comprises the sequence:
AAUUCCGCCCCUCUCCCUCCCCCCCCCCUAACGUUACUGGCCGAAGCCGC
UUGGAAUAAGGCCGGUGUGCGUUUGUCUAUAUGUGAUUUUCCACCAUA
UUGCCGUCUUUUGGCAAUGUGAGGGCCCGGAAACCUGGCCCUGUCUUCU
UGACGAGCAUUCCUAGGGGUCUUUCCCCUCUCGCCAAAGGAAUGCAAGG

UCUGUUGAAUGUCGUGAAGGAAGCAGUUCCUCUGGAAGCUUCUUGAAG
ACAAACAACGUCUGUAGCGACCCUUUGCAGGCAGCGGAACCCCCCACCU
GGCGACAGGUGCCUCUGCGGCCAAAAGCCACGUGUAUAAGAUACACCUG
CAAAGGCGGCACAACCCCAGUGCCACGUUGUGAGUUGGAUAGUUGUGG
AAAGAGUCAAAUGGCUCUCCUCAAGCGUAUUCAACAAGGGGCUGAAGG
AUGCCCAGAAGGUACCCCAUUGUAUGGGAUCUGAUCUGGGGCCUCGGU
GCACAUGCUUUACAUGUGUUUAGUCGAGGUUAAAAAAACGUCUAGGCC
CCCCGAACCACGGGGACGUGGUUUUCCUUUGAAAAACACGAUGAUAA
(SEQ ID NO: 5).

164. The RNA complement of a recombinant RNA molecule of claim 159, wherein the complement of a 3' UTR of a positive strand single-stranded RNA virus is a complement of a 3' UTR of a positive strand single-stranded RNA virus having no DNA stage.

165. The RNA complement of a recombinant RNA molecule of claim 164, wherein the complement of a 3' UTR of a positive strand single-stranded RNA virus having no DNA stage is a complement 3' UTR of a bromovirus

166. The RNA complement of a recombinant RNA molecule of claim 165, wherein the complement of a 3' UTR of a bromovirus is a complement of a 3' UTR of a Cowpea chlorotic mottle virus.

167. The RNA complement of a recombinant RNA molecule of claim 166, wherein the complement of a 3' UTR of a Cowpea chlorotic mottle virus comprises the sequence:

GGUCUCCUUAGAGAUCACCUAGUCUUUCGACUAGGCGCUGCCCACCAGU
CUUAUUACCUCACUAUGUGAGGUACUGGUACGAACUCCAAAGAGUUCU
UCCGAAGGGUUCAAGGAGUAAAACCCAAGGGCAGCUCAAUCCUCUUGU
AAAAGGAAGACGUUUCAACAACGAUUACCGUUUAAAGAAACGGUUAUA
ACUAGCCUUCAAGUAGGCCACACUAGUGUAACGCUCUUCAGCGGGCACU
(SEQ ID NO: 11).

168. The RNA complement of a recombinant RNA molecule of claim 159, further comprising an intron.

169. A transgenic host cell comprising the RNA complement of a recombinant RNA molecule of claim 159.

170. The transgenic host cell of claim 169, wherein the transgenic host cell is a transgenic plant cell.

171. A transgenic plant comprising the transgenic plant cell of claim 170.

172. The transgenic plant of claim 171, wherein the transgenic plant is a transgenic dicotyledonous plant.

173. The transgenic dicotyledonous plant of claim 172, wherein the transgenic dicotyledonous plant is a transgenic *Nicotiana* plant.

174. The transgenic *Nicotiana* plant of claim 173, wherein the transgenic *Nicotiana* plant is a transgenic *Nicotiana benthamiana* plant.

175. Transgenic seed comprising the RNA complement of a recombinant RNA molecule of claim 159.

176. A recombinant DNA molecule for construction of a vector for expressing a heterologous polypeptide in a transgenic cell, the recombinant DNA molecule comprising a promoter operably linked, in the 5' to 3' direction, to DNA sequence comprising:

a) at least one site for insertion of a sequence comprising coding sequence of a heterologous polypeptide in an antisense orientation;

b) a sequence complementary to an internal ribosome entry site; and

c) a 3' UTR of a positive strand single-stranded RNA virus.

177. The recombinant DNA molecule for construction of a vector for expressing a heterologous polypeptide in a transgenic cell of claim 176, wherein the promoter is a selected from the group consisting of a constitutive promoter and an inducible promoter.

178. The recombinant DNA molecule for construction of a vector for expressing a heterologous polypeptide in a transgenic cell of claim 177, wherein the promoter is a constitutive promoter.

179. The recombinant DNA molecule for construction of a vector for expressing a heterologous polypeptide in a transgenic cell of claim 178, wherein the constitutive promoter is a eukaryotic constitutive promoter selected from the group consisting of a cauliflower mosaic virus 35S promoter, a blueberry red ringspot virus promoter, a ubiquitin gene promoter, an actin gene promoter, an NeIF-4A10 promoter, a maize Adh1-based pEmu promoter, a barley leaf thionin BTH6 promoter, a cassava vein mosaic virus promoter, a sugarcane bacilliform badnavirus promoter and a histone gene promoter.

180. The recombinant DNA molecule for construction of a vector for expressing a heterologous polypeptide in a transgenic cell of claim 179, wherein the eukaryotic constitutive promoter is a cauliflower mosaic virus 35S promoter.

181. The recombinant DNA molecule for construction of a vector for expressing a heterologous polypeptide in a transgenic cell of claim 180, wherein the cauliflower mosaic virus 35S promoter comprises the sequence:

AGATTAGCCTTTTCAATTTCAGAAAGAATGCTAACCCACAGATGGTTAGA
GAGGCTTACGCAGCAGGTCTCATCAAGACGATCTACCCGAGCAATAATCT
CCAGGAAATCAAATACCTTCCCAAGAAGGTTAAAGATGCAGTCAAAAGAT
TCAGGACTAACTGCATCAAGAACACAGAGAAAGATATATTTCTCAAGATC
AGAAGTACTATTCCAGTATGGACGATTCAAGGCTTGCTTCACAAACCAAG
GCAAGTAATAGAGATTGGAGTCTCTAAAAAGGTAGTTCCCACTGAATCAA
AGGCCATGGAGTCAAAGATTCAAATAGAGGACCTAACAGAACTCGCCGTA
AAGACTGGCGAACAGTTCATACAGAGTCTCTTACGACTCAATGACAAGAA
GAAAATCTTCGTCAACATGGTGGAGCACGACACACTTGTCTACTCCAAAA
ATATCAAAGATACAGTCTCAGAAGACCAAAGGGCAATTGAGACTTTTCAA
CAAAGGGTAATATCCGGAAACCTCCTCGGATTCCATTGCCCAGCTATCTGT
CACTTTATTGTGAAGATAGTGGAAAAGGAAGGTGGCTCCTACAAATGCCA
TCATTGCGATAAAGGAAAGGCCATCGTTGAAGATGCCTCTGCCGACAGTG
GTCCCAAAGATGGACCCCCACCCACGAGGAGCATCGTGGAAAAAGAAGA
CGTTCCAACCACGTCTTCAAAGCAAGTGGATTGATGTGATATCTCCACTGA
CGTAAGGGATGACGCACAATCCCACTATCCTTCGCAAGACCCTTCCTCTAT
ATAAGGAAGTTCATTTCATTTGGAGAGAACACG (SEQ ID NO: 3).

182. The recombinant DNA molecule for construction of a vector for expressing a heterologous polypeptide in a transgenic cell of claim 176, wherein the coding sequence for a heterologous polypeptide encodes a polypeptide selected from the group consisting of a hormone, an enzyme, a cell toxin, a viral polypeptide, a cell surface polypeptide, and an intracellular polypeptide.

183. The recombinant DNA molecule for construction of a vector for expressing a heterologous polypeptide in a transgenic cell of claim 176, wherein the sequence complementary to an internal ribosome entry site is a sequence complementary to an IRES selected from the group consisting of a picornavirus IRES, a foot-and-mouth disease virus IRES, an encephalomyocarditis virus IRES, a hepatitis A virus IRES, a hepatitis C virus IRES, a human rhinovirus IRES, a poliovirus IRES,

a swine vesicular disease virus IRES, a turnip mosaic potyvirus IRES, a human fibroblast growth factor 2 mRNA IRES, a pestivirus IRES, a Leishmania RNA virus IRES, a Moloney murine leukemia virus IRES a human rhinovirus 14 IRES, an aphthovirus IRES, a human immunoglobulin heavy chain binding protein mRNA IRES, a *Drosophila* Antennapedia mRNA IRES, a human fibroblast growth factor 2 mRNA IRES, a hepatitis G virus IRES, a tobamovirus IRES, a vascular endothelial growth factor mRNA IRES, a Coxsackie B group virus IRES, a c-myc protooncogene mRNA IRES, a human MYT2 mRNA IRES, a human parechovirus type 1 virus IRES, a human parechovirus type 2 virus IRES, a eukaryotic initiation factor 4GI mRNA IRES, a Plautia stali intestine virus IRES, a Theiler's murine encephalomyelitis virus IRES, a bovine enterovirus IRES, a connexin 43 mRNA IRES, a homeodomain protein Gtx mRNA IRES, an AML1 transcription factor mRNA IRES, an NF-kappa B repressing factor mRNA IRES, an X-linked inhibitor of apoptosis mRNA IRES, a cricket paralysis virus RNA IRES, a p58(PITSLRE) protein kinase mRNA IRES, an ornithine decarboxylase mRNA IRES, a connexin-32 mRNA IRES, a bovine viral diarrhea virus IRES, an insulin-like growth factor I receptor mRNA IRES, a human immunodeficiency virus type 1 gag gene IRES, a classical swine fever virus IRES, a Kaposi's sarcoma-associated herpes virus IRES, a short IRES selected from a library of random oligonucleotides, a Jembrana disease virus IRES, an apoptotic protease-activating factor 1 mRNA IRES, a Rhopalosiphum padi virus IRES, a cationic amino acid transporter mRNA IRES, a human insulin-like growth factor II leader 2 mRNA IRES, a giardiavirus IRES, a Smad5 mRNA IRES, a porcine teschovirus-1 talfan IRES, a *Drosophila* Hairless mRNA IRES, an hSNM1 mRNA IRES, a Cbfa1/Runx2 mRNA IRES, an Epstein-Barr virus IRES, a hibiscus chlorotic ringspot virus IRES, a rat pituitary vasopressin V1b receptor mRNA IRES, and a human hsp70 mRNA IRES.

184. The recombinant DNA molecule for construction of a vector for expressing a heterologous polypeptide in a transgenic cell of claim 183, wherein the sequence complementary to an internal ribosome entry site is a sequence complementary to a picornavirus internal ribosome entry site.

185. The recombinant DNA molecule for construction of a vector for expressing a heterologous polypeptide in a transgenic cell of claim 184, wherein the sequence complementary to a picornavirus internal ribosome entry site comprises the sequence:

TTATCATCGTGTTTTTCAAAGGAAAACCACGTCCCCGTGGTTCGGGGGGCC
TAGACGTTTTTTTAACCTCGACTAAACACATGTAAAGCATGTGCACCGAG
GCCCCAGATCAGATCCCATACAATGGGGTACCTTCTGGGCATCCTTCAGCC
CCTTGTTGAATACGCTTGAGGAGAGCCATTTGACTCTTTCCACAACTATCC
AACTCACAACGTGGCACTGGGGTTGTGCCGCCTTTGCAGGTGTATCTTATA
CACGTGGCTTTTGGCCGCAGAGGCACCTGTCGCCAGGTGGGGGGTTCCGC
TGCCTGCAAAGGGTCGCTACAGACGTTGTTTGTCTTCAAGAAGCTTCCAGA
GGAACTGCTTCCTTCACGACATTCAACAGACCTTGCATTCCTTTGGCGAGA
GGGGAAAGACCCCTAGGAATGCTCGTCAAGAAGACAGGGCCAGGTTTCC
GGGCCCTCACATTGCCAAAAGACGGCAATATGGTGGAAAATCACATATAG
ACAAACGCACACCGGCCTTATTCCAAGCGGCTTCGGCCAGTAACGTTAGG
GGGGGGGGAGGGAGAGGGGCGGAATT (SEQ ID NO: 6).

186. The recombinant DNA molecule for construction of a vector for expressing a heterologous polypeptide in a transgenic cell of claim 176, wherein the 3' UTR of a positive strand single-stranded RNA virus is a 3' UTR of a positive strand single-stranded RNA virus having no DNA stage.

187. The recombinant DNA molecule for construction of a vector for expressing a heterologous polypeptide in a transgenic cell of claim 186, wherein the 3' UTR of a positive strand single-stranded RNA virus having no DNA stage is a 3' UTR of a bromovirus.

188. The recombinant DNA molecule for construction of a vector for expressing a heterologous polypeptide in a transgenic cell of claim 187, wherein the 3' UTR of a bromovirus is a 3' UTR of a Cowpea chlorotic mottle virus.

189. The recombinant DNA molecule for construction of a vector for expressing a heterologous polypeptide in a transgenic cell of claim 188, wherein a DNA copy of the 3' UTR of a Cowpea chlorotic mottle virus comprises the sequence:
AGTGCCCGCTGAAGAGCGTTACACTAGTGTGGCCTACTTGAAGGCTAGTT
ATAACCGTTTCTTTAAACGGTAATCGTTGTTGAAACGTCTTCCTTTTACAA
GAGGATTGAGCTGCCCTTGGGTTTTACTCCTTGAACCCTTCGGAAGAACTC
TTTGGAGTTCGTACCAGTACCTCACATAGTGAGGTAATAAGACTGGTGGG
CAGCGCCTAGTCGAAAGACTAGGTGATCTCTAAGGAGACC (SEQ ID NO: 8).

190. The recombinant DNA molecule for construction of a vector for expressing a heterologous polypeptide in a transgenic cell of claim 176, further comprising a sequence complementary to an intron.

191. The recombinant DNA molecule for construction of a vector for expressing a heterologous polypeptide in a transgenic cell of claim 176, further comprising a transcription termination signal.

192. The recombinant DNA molecule for construction of a vector for expressing a heterologous polypeptide in a transgenic cell of claim 176, wherein the at least one site for insertion of a sequence comprising coding sequence of a heterologous polypeptide in an antisense orientation comprises a recombination site.

193. The recombinant DNA molecule for construction of a vector for expressing a heterologous polypeptide in a transgenic cell of claim 192, wherein the recombination site is selected from the group consisting of a bacteriophage lambda *att* site and a topoisomerase I-based recombination site.

194. The recombinant DNA molecule for construction of a vector for expressing a heterologous polypeptide in a transgenic cell of claim 176, wherein the at least one site for insertion of a sequence comprising coding sequence of a heterologous polypeptide in an antisense orientation comprises at least one restriction enzyme recognition site.

195. The recombinant DNA molecule for construction of a vector for expressing a heterologous polypeptide in a transgenic cell of claim 176, wherein the at least one restriction enzyme recognition site comprises a polylinker.

196. A method for making a transgenic vector for expression of a heterologous polypeptide in a transgenic cell, the method comprising:

a) providing a DNA molecule for construction of a vector for expressing a heterologous polypeptide in a transgenic cell, the DNA molecule comprising a promoter operably linked, in the 5' to 3' direction, to a DNA sequence comprising:

i) at least one site for insertion of a sequence comprising coding sequence of a heterologous polypeptide in an antisense orientation;

ii) a sequence complementary to an internal ribosome entry site; and

iii) a 3' UTR of a positive strand single-stranded RNA virus; and

b) inserting a sequence encoding a heterologous polypeptide into the insertion site of the DNA molecule in an antisense orientation relative to the direction of transcription from the promoter.

197. The method for making a transgenic vector for expression of a heterologous polypeptide in a transgenic cell of claim 196, wherein the promoter is a selected from the group consisting of a constitutive promoter and an inducible promoter.

198. The method for making a transgenic vector for expression of a heterologous polypeptide in a transgenic cell of claim 197, wherein the promoter is a constitutive promoter.

199. The method for making a transgenic vector for expression of a heterologous polypeptide in a transgenic cell of claim 198, wherein the constitutive promoter is a eukaryotic constitutive promoter selected from the group consisting of a cauliflower mosaic virus 35S promoter, a blueberry red ringspot virus promoter, a ubiquitin gene promoter, an actin gene promoter, an NeIF-4A10 promoter, a maize Adh1-based pEmu promoter, a barley leaf thionin BTH6 promoter, a cassava vein mosaic virus promoter, a sugarcane bacilliform badnavirus promoter and a histone gene promoter.

200. The method for making a transgenic vector for expression of a heterologous polypeptide in a transgenic cell of claim 199, wherein the eukaryotic constitutive promoter is a cauliflower mosaic virus 35S promoter.

201. The method for making a transgenic vector for expression of a heterologous polypeptide in a transgenic cell of claim 200, wherein the cauliflower mosaic virus 35S promoter comprises the sequence:

AGATTAGCCTTTTCAATTTCAGAAAGAATGCTAACCCACAGATGGTTAGA
GAGGCTTACGCAGCAGGTCTCATCAAGACGATCTACCCGAGCAATAATCT
CCAGGAAATCAAATACCTTCCCAAGAAGGTTAAAGATGCAGTCAAAAGAT
TCAGGACTAACTGCATCAAGAACACAGAGAAAGATATATTTCTCAAGATC
AGAAGTACTATTCCAGTATGGACGATTCAAGGCTTGCTTCACAAACCAAG
GCAAGTAATAGAGATTGGAGTCTCTAAAAAGGTAGTTCCCACTGAATCAA
AGGCCATGGAGTCAAAGATTCAAATAGAGGACCTAACAGAACTCGCCGTA
AAGACTGGCGAACAGTTCATACAGAGTCTCTTACGACTCAATGACAAGAA

GAAAATCTTCGTCAACATGGTGGAGCACGACACACTTGTCTACTCCAAAA
ATATCAAAGATACAGTCTCAGAAGACCAAAGGGCAATTGAGACTTTTCAA
CAAAGGGTAATATCCGGAAACCTCCTCGGATTCCATTGCCCAGCTATCTGT
CACTTTATTGTGAAGATAGTGGAAAAGGAAGGTGGCTCCTACAAATGCCA
TCATTGCGATAAAGGAAAGGCCATCGTTGAAGATGCCTCTGCCGACAGTG
GTCCCAAAGATGGACCCCCACCCACGAGGAGCATCGTGGAAAAAGAAGA
CGTTCCAACCACGTCTTCAAAGCAAGTGGATTGATGTGATATCTCCACTGA
CGTAAGGGATGACGCACAATCCCACTATCCTTCGCAAGACCCTTCCTCTAT
ATAAGGAAGTTCATTTCATTTGGAGAGAACACG (SEQ ID NO: 3).

202. The method for making a transgenic vector for expression of a heterologous polypeptide in a transgenic cell of claim 196, wherein the coding sequence for a heterologous polypeptide encodes a polypeptide selected from the group consisting of a hormone, an enzyme, a cell toxin, a viral polypeptide, a cell surface polypeptide, and an intracellular polypeptide.

203. The method for making a transgenic vector for expression of a heterologous polypeptide in a transgenic cell of claim 196, wherein the sequence complementary to an internal ribosome entry site is a sequence complementary to an IRES selected from the group consisting of a picornavirus IRES, a foot-and-mouth disease virus IRES, an encephalomyocarditis virus IRES, a hepatitis A virus IRES, a hepatitis C virus IRES, a human rhinovirus IRES, a poliovirus IRES, a swine vesicular disease virus IRES, a turnip mosaic potyvirus IRES, a human fibroblast growth factor 2 mRNA IRES, a pestivirus IRES, a Leishmania RNA virus IRES, a Moloney murine leukemia virus IRES a human rhinovirus 14 IRES, an aphthovirus IRES, a human immunoglobulin heavy chain binding protein mRNA IRES, a *Drosophila* Antennapedia mRNA IRES, a human fibroblast growth factor 2 mRNA IRES, a hepatitis G virus IRES, a tobamovirus IRES, a vascular endothelial growth factor mRNA IRES, a Coxsackie B group virus IRES, a c-myc protooncogene mRNA IRES, a human MYT2 mRNA IRES, a human parechovirus type 1 virus IRES, a human parechovirus type 2 virus IRES, a eukaryotic initiation factor 4GI mRNA IRES, a Plautia stali intestine virus IRES, a Theiler's murine encephalomyelitis virus IRES, a bovine enterovirus IRES, a connexin 43 mRNA IRES, a homeodomain protein Gtx mRNA IRES, an AML1 transcription factor mRNA IRES, an NF-kappa B repressing factor mRNA IRES, an X-linked inhibitor of apoptosis mRNA IRES, a cricket paralysis virus RNA IRES, a p58(PITSLRE) protein kinase mRNA IRES, an

ornithine decarboxylase mRNA IRES, a connexin-32 mRNA IRES, a bovine viral diarrhea virus IRES, an insulin-like growth factor I receptor mRNA IRES, a human immunodeficiency virus type 1 gag gene IRES, a classical swine fever virus IRES, a Kaposi's sarcoma-associated herpes virus IRES, a short IRES selected from a library of random oligonucleotides, a Jembrana disease virus IRES, an apoptotic protease-activating factor 1 mRNA IRES, a Rhopalosiphum padi virus IRES, a cationic amino acid transporter mRNA IRES, a human insulin-like growth factor II leader 2 mRNA IRES, a giardiavirus IRES, a Smad5 mRNA IRES, a porcine teschovirus-1 talfan IRES, a *Drosophila* Hairless mRNA IRES, an hSNM1 mRNA IRES, a Cbfa1/Runx2 mRNA IRES, an Epstein-Barr virus IRES, a hibiscus chlorotic ringspot virus IRES, a rat pituitary vasopressin V1b receptor mRNA IRES, and a human hsp70 mRNA IRES.

204. The method for making a transgenic vector for expression of a heterologous polypeptide in a transgenic cell of claim 203, wherein the sequence complementary to an internal ribosome entry site is a sequence complementary to a picornavirus internal ribosome entry site.

205. The method for making a transgenic vector for expression of a heterologous polypeptide in a transgenic cell of claim 204, wherein the sequence complementary to a picornavirus internal ribosome entry site comprises the sequence:
TTATCATCGTGTTTTTCAAAGGAAAACCACGTCCCCGTGGTTCGGGGGGCC
TAGACGTTTTTTTAACCTCGACTAAACACATGTAAAGCATGTGCACCGAG
GCCCCAGATCAGATCCCATACAATGGGGTACCTTCTGGGCATCCTTCAGCC
CCTTGTTGAATACGCTTGAGGAGAGCCATTTGACTCTTTCCACAACTATCC
AACTCACAACGTGGCACTGGGGTTGTGCCGCCTTTGCAGGTGTATCTTATA
CACGTGGCTTTTGGCCGCAGAGGCACCTGTCGCCAGGTGGGGGGTTCCGC
TGCCTGCAAAGGGTCGCTACAGACGTTGTTTGTCTTCAAGAAGCTTCCAGA
GGAACTGCTTCCTTCACGACATTCAACAGACCTTGCATTCCTTTGGCGAGA
GGGGAAAGACCCCTAGGAATGCTCGTCAAGAAGACAGGGCCAGGTTTCC
GGGCCCTCACATTGCCAAAAGACGGCAATATGGTGGAAAATCACATATAG
ACAAACGCACACCGGCCTTATTCCAAGCGGCTTCGGCCAGTAACGTTAGG
GGGGGGGGAGGGAGAGGGGCGGAATT (SEQ ID NO: 6).

206. The method for making a transgenic vector for expression of a heterologous polypeptide in a transgenic cell of claim 196, wherein the 3' UTR of a

positive strand single-stranded RNA virus is a 3' UTR of a positive strand single-stranded RNA virus having no DNA stage.

207. The method for making a transgenic vector for expression of a heterologous polypeptide in a transgenic cell of claim 206, wherein the 3' UTR of a positive strand single-stranded RNA virus having no DNA stage is a 3' UTR of a bromovirus.

208. The method for making a transgenic vector for expression of a heterologous polypeptide in a transgenic cell of claim 207, wherein the 3' UTR of a bromovirus is a 3' UTR of a Cowpea chlorotic mottle virus.

209. The method for making a transgenic vector for expression of a heterologous polypeptide in a transgenic cell of claim 208, wherein a DNA copy of the 3' UTR of a Cowpea chlorotic mottle virus comprises the sequence: AGTGCCCGCTGAAGAGCGTTACACTAGTGTGGCCTACTTGAAGGCTAGTT ATAACCGTTTCTTTAAACGGTAATCGTTGTTGAAACGTCTTCCTTTTACAA GAGGATTGAGCTGCCCTTGGGTTTTACTCCTTGAACCCTTCGGAAGAACTC TTTGGAGTTCGTACCAGTACCTCACATAGTGAGGTAATAAGACTGGTGGG CAGCGCCTAGTCGAAAGACTAGGTGATCTCTAAGGAGACC (SEQ ID NO: 8).

210. The method for making a transgenic vector for expression of a heterologous polypeptide in a transgenic cell of claim 196, further comprising a sequence complementary to an intron.

211. The method for making a transgenic vector for expression of a heterologous polypeptide in a transgenic cell of claim 196, further comprising a transcription termination signal.

212. The method for making a transgenic vector for expression of a heterologous polypeptide in a transgenic cell of claim 196, wherein the at least one site for insertion of a sequence comprising coding sequence of a heterologous polypeptide in an antisense orientation comprises a recombination site.

213. The method for making a transgenic vector for expression of a heterologous polypeptide in a transgenic cell of claim 212, wherein the recombination site is selected from the group consisting of a bacteriophage lambda *att* site and a topoisomerase I-based recombination site.

214. The method for making a transgenic vector for expression of a heterologous polypeptide in a transgenic cell of claim 196, wherein the at least one

site for insertion of a sequence comprising coding sequence of a heterologous polypeptide in an antisense orientation comprises at least one restriction enzyme recognition site.

215. The method for making a transgenic vector for expression of a heterologous polypeptide in a transgenic cell of claim 196, wherein the at least one restriction enzyme recognition site comprises a polylinker.

216. A kit for constructing a vector for expressing a heterologous polypeptide in a transgenic cell, the kit comprising a DNA molecule for construction of a vector for expressing a heterologous polypeptide in a transgenic cell, the DNA molecule comprising a promoter operably linked, in the 5' to 3' direction, to a DNA sequence comprising:

a) at least one site for insertion of a sequence comprising coding sequence of a heterologous polypeptide in an antisense orientation;

b) a sequence complementary to an internal ribosome entry site; and

c) a 3' UTR of a positive strand single-stranded RNA virus.

217. The kit for constructing a vector for expressing a heterologous polypeptide in a transgenic cell of claim 216, wherein the promoter is a selected from the group consisting of a constitutive promoter and an inducible promoter.

218. The kit for constructing a vector for expressing a heterologous polypeptide in a transgenic cell of claim 217, wherein the promoter is a constitutive promoter.

219. The kit for constructing a vector for expressing a heterologous polypeptide in a transgenic cell of claim 218, wherein the constitutive promoter is a eukaryotic constitutive promoter selected from the group consisting of a cauliflower mosaic virus 35S promoter, a blueberry red ringspot virus promoter, a ubiquitin gene promoter, an actin gene promoter, an NeIF-4A10 promoter, a maize Adh1-based pEmu promoter, a barley leaf thionin BTH6 promoter, a cassava vein mosaic virus promoter, a sugarcane bacilliform badnavirus promoter and a histone gene promoter.

220. The kit for constructing a vector for expressing a heterologous polypeptide in a transgenic cell of claim 219, wherein the eukaryotic constitutive promoter is a cauliflower mosaic virus 35S promoter.

221. The kit for constructing a vector for expressing a heterologous polypeptide in a transgenic cell of claim 220, wherein the cauliflower mosaic virus

35S promoter comprises the sequence:

AGATTAGCCTTTTCAATTTCAGAAAGAATGCTAACCCACAGATGGTTAGA
GAGGCTTACGCAGCAGGTCTCATCAAGACGATCTACCCGAGCAATAATCT
CCAGGAAATCAAATACCTTCCCAAGAAGGTTAAAGATGCAGTCAAAAGAT
TCAGGACTAACTGCATCAAGAACACAGAGAAAGATATATTTCTCAAGATC
AGAAGTACTATTCCAGTATGGACGATTCAAGGCTTGCTTCACAAACCAAG
GCAAGTAATAGAGATTGGAGTCTCTAAAAAGGTAGTTCCCACTGAATCAA
AGGCCATGGAGTCAAAGATTCAAATAGAGGACCTAACAGAACTCGCCGTA
AAGACTGGCGAACAGTTCATACAGAGTCTCTTACGACTCAATGACAAGAA
GAAAATCTTCGTCAACATGGTGGAGCACGACACACTTGTCTACTCCAAAA
ATATCAAAGATACAGTCTCAGAAGACCAAAGGGCAATTGAGACTTTTCAA
CAAAGGGTAATATCCGGAAACCTCCTCGGATTCCATTGCCCAGCTATCTGT
CACTTTATTGTGAAGATAGTGGAAAAGGAAGGTGGCTCCTACAAATGCCA
TCATTGCGATAAAGGAAAGGCCATCGTTGAAGATGCCTCTGCCGACAGTG
GTCCCAAAGATGGACCCCCACCCACGAGGAGCATCGTGGAAAAAGAAGA
CGTTCCAACCACGTCTTCAAAGCAAGTGGATTGATGTGATATCTCCACTGA
CGTAAGGGATGACGCACAATCCCACTATCCTTCGCAAGACCCTTCCTCTAT
ATAAGGAAGTTCATTTCATTTGGAGAGAACACG (SEQ ID NO: 3).

222. The kit for constructing a vector for expressing a heterologous polypeptide in a transgenic cell of claim 216, wherein the coding sequence for a heterologous polypeptide encodes a polypeptide selected from the group consisting of a hormone, an enzyme, a cell toxin, a viral polypeptide, a cell surface polypeptide, and an intracellular polypeptide.

223. The kit for constructing a vector for expressing a heterologous polypeptide in a transgenic cell of claim 216, wherein the sequence complementary to an internal ribosome entry site is a sequence complementary to an IRES selected from the group consisting of a picornavirus IRES, a foot-and-mouth disease virus IRES, an encephalomyocarditis virus IRES, a hepatitis A virus IRES, a hepatitis C virus IRES, a human rhinovirus IRES, a poliovirus IRES, a swine vesicular disease virus IRES, a turnip mosaic potyvirus IRES, a human fibroblast growth factor 2 mRNA IRES, a pestivirus IRES, a Leishmania RNA virus IRES, a Moloney murine leukemia virus IRES a human rhinovirus 14 IRES, an aphthovirus IRES, a human immunoglobulin heavy chain binding protein mRNA IRES, a *Drosophila* Antennapedia mRNA IRES, a human fibroblast growth factor 2 mRNA IRES, a hepatitis G virus IRES, a

tobamovirus IRES, a vascular endothelial growth factor mRNA IRES, a Coxsackie B group virus IRES, a c-myc protooncogene mRNA IRES, a human MYT2 mRNA IRES, a human parechovirus type 1 virus IRES, a human parechovirus type 2 virus IRES, a eukaryotic initiation factor 4GI mRNA IRES, a Plautia stali intestine virus IRES, a Theiler's murine encephalomyelitis virus IRES, a bovine enterovirus IRES, a connexin 43 mRNA IRES, a homeodomain protein Gtx mRNA IRES, an AML1 transcription factor mRNA IRES, an NF-kappa B repressing factor mRNA IRES, an X-linked inhibitor of apoptosis mRNA IRES, a cricket paralysis virus RNA IRES, a p58(PITSLRE) protein kinase mRNA IRES, an ornithine decarboxylase mRNA IRES, a connexin-32 mRNA IRES, a bovine viral diarrhea virus IRES, an insulin-like growth factor I receptor mRNA IRES, a human immunodeficiency virus type 1 gag gene IRES, a classical swine fever virus IRES, a Kaposi's sarcoma-associated herpes virus IRES, a short IRES selected from a library of random oligonucleotides, a Jembrana disease virus IRES, an apoptotic protease-activating factor 1 mRNA IRES, a Rhopalosiphum padi virus IRES, a cationic amino acid transporter mRNA IRES, a human insulin-like growth factor II leader 2 mRNA IRES, a giardiavirus IRES, a Smad5 mRNA IRES, a porcine teschovirus-1 talfan IRES, a *Drosophila* Hairless mRNA IRES, an hSNM1 mRNA IRES, a Cbfa1/Runx2 mRNA IRES, an Epstein-Barr virus IRES, a hibiscus chlorotic ringspot virus IRES, a rat pituitary vasopressin V1b receptor mRNA IRES, and a human hsp70 mRNA IRES.

224. The kit for constructing a vector for expressing a heterologous polypeptide in a transgenic cell of claim 223, wherein the sequence complementary to an internal ribosome entry site is a sequence complementary to a picornavirus internal ribosome entry site.

225. The kit for constructing a vector for expressing a heterologous polypeptide in a transgenic cell of claim 224, wherein the sequence complementary to a picornavirus internal ribosome entry site comprises the sequence:

TTATCATCGTGTTTTTCAAAGGAAAACCACGTCCCCGTGGTTCGGGGGGCC
TAGACGTTTTTTTAACCTCGACTAAACACATGTAAAGCATGTGCACCGAG
GCCCCAGATCAGATCCCATACAATGGGGTACCTTCTGGGCATCCTTCAGCC
CCTTGTTGAATACGCTTGAGGAGAGCCATTTGACTCTTTCCACAACTATCC
AACTCACAACGTGGCACTGGGGTTGTGCCGCCTTTGCAGGTGTATCTTATA
CACGTGGCTTTTGGCCGCAGAGGCACCTGTCGCCAGGTGGGGGGTTCCGC
TGCCTGCAAAGGGTCGCTACAGACGTTGTTTGTCTTCAAGAAGCTTCCAGA

GGAACTGCTTCCTTCACGACATTCAACAGACCTTGCATTCCTTTGGCGAGA
GGGGAAAGACCCCTAGGAATGCTCGTCAAGAAGACAGGGCCAGGTTTCC
GGGCCCTCACATTGCCAAAAGACGGCAATATGGTGGAAAATCACATATAG
ACAAACGCACACCGGCCTTATTCCAAGCGGCTTCGGCCAGTAACGTTAGG
GGGGGGGGAGGGAGAGGGGCGGAATT (SEQ ID NO: 6).

226. The kit for constructing a vector for expressing a heterologous polypeptide in a transgenic cell of claim 216, wherein the 3' UTR of a positive strand single-stranded RNA virus is a 3' UTR of a positive strand single-stranded RNA virus having no DNA stage.

227. The kit for constructing a vector for expressing a heterologous polypeptide in a transgenic cell of claim 226, wherein the 3' UTR of a positive strand single-stranded RNA virus having no DNA stage is a 3' UTR of a bromovirus.

228. The kit for constructing a vector for expressing a heterologous polypeptide in a transgenic cell of claim 227, wherein the 3' UTR of a bromovirus is a 3' UTR of a Cowpea chlorotic mottle virus.

229. The kit for constructing a vector for expressing a heterologous polypeptide in a transgenic cell of claim 228, wherein a DNA copy of the 3' UTR of a Cowpea chlorotic mottle virus comprises the sequence:
AGTGCCCGCTGAAGAGCGTTACACTAGTGTGGCCTACTTGAAGGCTAGTT
ATAACCGTTTCTTTAAACGGTAATCGTTGTTGAAACGTCTTCCTTTTACAA
GAGGATTGAGCTGCCCTTGGGTTTTACTCCTTGAACCCTTCGGAAGAACTC
TTTGGAGTTCGTACCAGTACCTCACATAGTGAGGTAATAAGACTGGTGGG
CAGCGCCTAGTCGAAAGACTAGGTGATCTCTAAGGAGACC (SEQ ID NO: 8).

230. The kit for constructing a vector for expressing a heterologous polypeptide in a transgenic cell of claim 216, further comprising a sequence complementary to an intron.

231. The kit for constructing a vector for expressing a heterologous polypeptide in a transgenic cell of claim 216, further comprising a transcription termination signal.

232. The kit for constructing a vector for expressing a heterologous polypeptide in a transgenic cell of claim 216, wherein the at least one site for insertion of a sequence comprising coding sequence of a heterologous polypeptide in an antisense orientation comprises a recombination site.

233. The kit for constructing a vector for expressing a heterologous polypeptide in a transgenic cell of claim 232, wherein the recombination site is selected from the group consisting of a bacteriophage lambda *att* site and a topoisomerase I-based recombination site.

234. The kit for constructing a vector for expressing a heterologous polypeptide in a transgenic cell of claim 216, wherein the at least one site for insertion of a sequence comprising coding sequence of a heterologous polypeptide in an antisense orientation comprises at least one restriction enzyme recognition site.

235. The kit for constructing a vector for expressing a heterologous polypeptide in a transgenic cell of claim 216, wherein the at least one restriction enzyme recognition site comprises a polylinker.